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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/552,761	04/18/2000	Stefan Eckart	0100.0000550	3105

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EXAMINER

REKSTAD, ERICK J

ART UNIT	PAPER NUMBER
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2613

DATE MAILED: 09/24/2003

5

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/552,761

Applicant(s)

ECKART, STEFAN

Examiner

Erick Rekstad

Art Unit

2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6-27 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 5 is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-8 and 11-27 is/are rejected.
- 7) ☒ Claim(s) 9, 10 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3,6-8, 11-19 and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent 5,686,963 to Uz et al.

[claim 1]

Uz teaches the use of a quantizer step size to control the number of bits used to encode each macroblock (Col 2 Lines 52-58). Uz also states that adjusting the quantization stepsize the bits for a frame in a GOP can be set (Col 12 Lines 4-9). It is clear that the quantizer step size (Q_n) can be calculated such that a first number of bits generated at an output of the constant-bit-rate finite-buffer-size video encoder is constant over a first given number of frames (GOP) starting at a current frame and that the quantizer step size can be calculated for a second given number of frames (Col 12 Lines 56-60).

[claim 2]

Uz use of the quantization stepsize to adjust the bits for a frame in a GOP clearly shows that the quantization stepsize can be calculated over a GOP and then calculated again for a GOP of the same size (Col 1 Lines 50-51, Col 12).

[claim 3]

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Uz teaches calculating a power value (total activity (TA)) for each frame that is used to change the rate control quantization scale factor (Col 11 Lines 61-66). Adjusting a number of bits in a second frame based on the power value (TA) for the first frame is achieved by using the rate control quantization scale factor (Col 12 Lines 49-55).

[claims 6,7,8 and 24]

Uz describes obtaining a prediction error frame (motion compensated prediction) including a plurality of pixel-level error values (subtracting the motion compensated prediction of a macroblock from the macroblock to be encoded) (Col 9 Lines 23-27). A calculated sum of absolute values of the pixel-level error values for a pixel block is obtained (displaced frame difference activity (DPDA) (Col 9 Lines 23-27). A calculation of an expected number of bits for the pixel block based on the sum of the absolute values (DFDA) is done by the function to determine if a macroblock should be inter or intra coded (Col 9 Lines 38-42). The expected number of bits for a block, frame and GOP are calculated (Bit Budget) and used to obtain constant-bit-rate video encoding (Col 12).

[claims 11-14]

Uz describes a method of predicting a relationship between a quantizer scale factor and a number of encoded bits of a pixel block based on a known relationship in previous pixel blocks of a same type and using the quantizer scale factor to control a pixel block level rate (Col 12 Lines 56-67, Col 13 Lines 3-9).

[claims 15-18]

Uz describes calculating a group-of-picture-level and picture-level predictions for a number of bits encoded for a group of pictures (Col 11 Lines 42-49). The variable TA is dependent on the total activity of all the macroblocks and because the picture-level determination for number of bits is based on the TA variable and the TA is dependent on total activity of macroblocks, the determination is then a prediction at the pixel-block-level (Col 8 Lines 65-67, Col 9 Lines 8-10). Calculating the picture-level prediction for the number of bits encoded for the picture is based on a pixel block type (Col 12), a sum of absolute values of pixel-level error values (Col 11 Line 25) and a pixel block complexity (TA). Calculating the group-of-pictures-level prediction for the number of bits encoded for the group-of-pictures is based on a global complexity value (Reff, Col 12). The quantizer scale factor is adjusted based on the three predictions (Col 11 Lines 60-66).

[claim 19]

Uz describes the detection of a scene change using a prediction error image and using the scene change to reset the global complexity history T_{Ai}. T_{Ai} is used to provide the rate control for the video encoder (Col 11 Lines 10-55).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4, 20-22 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uz.

[claim 4]

Uz's TA variable is a sum of the total activities (sum of the absolute differences of pixel blocks) for all the macroblocks in a frame (Col 8 Lines 51-64). The controller maintains an average TA for the frames of a scene (Col 11 Lines 17-18). It would be obvious to one skilled in the art at the time of the invention to calculate the average for each block or each frame as this decision would be based on the required accuracy of the encoder, storage space and computation time.

[claims 21-22]

Uz teaches the use of a method for rate control for a variable-bit-rate video encoder which comprises a preprocessing stage for determining a power value(Bi) and a group-of-picture-level rate control block operatively coupled to the preprocessing stage (Col 20 Lines 49-67, Col 21, Col 22). This method also includes a feedback mechanism where bits for future frames can be adjusted based on the bits used by the currently encoded frame (Col 22 Lines 24-48). Uz also teaches a different method for constant-bit-rate video encoding. Uz does not teach the use of including this method in an apparatus or the use of this method in a constant-bit-rate finite-buffer-size video encoder. It would be obvious to one skilled in the art at the time of the invention to include Uz's variable-bit-rate encoding method using the feedback mechanism to produce a simple constant-bit-rate video encoding apparatus.

Claims 20 and 25 -27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uz in view of US Patent 5,724,100 to Kuchibhotla.

[claim 20]

Uz teaches the use of a method for rate control that obtains a scene change indication from a prediction error image and using the scene change indication to reset a global complexity history and using the global complexity history to provide the rate control for the video encoder. Uz does not teach the method of counting a first number of intra coded pixel blocks in the prediction error image, counting a second number of non-intra coded pixel blocks in the prediction error image, calculating a ratio of the first number and the second number, comparing the ratio to a threshold to determine a result and using the result as a scene change indication. Kuchibhotla does teach this method as a means to prevent exceeding a coding bit budget (Col 2 Lines 35-58, Col 3 Lines 50-67). It would be obvious to one skilled in the art at the time of the invention to use the method of Uz in conjunction with the method of Kuchibhotla in order to prevent exceeding a coding bit budget.

[claims 25-27]

Although Uz fails to teach the determining of intra vs non-intra blocks, Kuchibhotla does (Fig. 1 element 134). Since both systems provide constant-bit-rate it would be obvious to one skilled in the art at the time of the invention to substitute Kuchibhotla's scene change detector into Uz's system since the scene change detector of Kuchibhotla has the advantage of accurately detecting scene change for half pixel motion compensation.

Allowable Subject Matter

Claim 5 allowed.

Claims 9 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

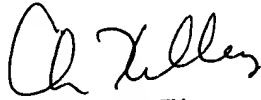
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erick Rekstad whose telephone number is 703-305-5543. The examiner can normally be reached on 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chris Kelley can be reached on 703-305-4856. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

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